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AUSTRALIAN FORMICIDAE.

By J. Clark.

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## AUSTRALIAN FORMICIDAE.

(With ten text figures.)

By J. CLARK.

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The classification of the Australian Ants belonging to the sub-family *Cerapachyinae*<sup>1</sup> has long been a matter of much doubt amongst Myrmecologists, mainly, it would appear, through the lack of sufficient material and knowledge of their habits and life histories.

Prof. Wheeler in a valuable paper on "The Australian Ants of the ponerine tribe *Ceraphachyini*,"<sup>2</sup> dealt with all the Australian species, and added nine, bringing the total up to 28 species and varieties. Since then Crawley<sup>3</sup> has added one, and in the present paper it is proposed adding 10 more, bringing the total to 39, of which 16 are Western Australia forms. (*Eusphinctus* (*Nothosphinctus*) *clarus*, Forel, was recorded from Adelaide River, N.W. Australia, but as this river is in the Northern Territory the species is excluded as a Western Australian form.)

In his paper, Wheeler (p. 217) quotes and supports Ernest Andre,<sup>4</sup> who says:—"I believe rather, till proof to the contrary is forthcoming, that the species of the genus *Sphinctomyrmer* should be restricted to the single *S. stali*, of Brazil, which is the type, and that all the Asiatic and Australian species should constitute the genus *Eusphinctus*, Emery, without distinctions between those having 12 or 11 antennal joints. Besides such characters as may be exhibited by the still unknown worker of *Sphinctomyrmer*, this genus is characterised by a normal female, whereas the female of *Eusphinctus* is ergatomorphic."

Lately several colonies of this group of ants have been found around Perth, the study of which has yielded additional very interesting facts to the existing knowledge of the group. This information tends to complicate matters a little at present, as one species of the genus *Eusphinctus*, s. str. (*E. occidentalis*, sp. nov.) has a perfectly developed female. The nest of this species contained 20 normal but dealated females.

It will be necessary to alter the existing classification, but with the present state of our knowledge it is better to let matters stand

(1) *Psyche*, vol. xxvii., pp. 46-53, 1920.

(2) *Proc. Amer. Acad. Arts and Sc.* 53, 3, pp. 215-265, 1918.

(3) *Ann. Mag. Nat. Hist.* 9, pp. 433-4, 1922.

(4) *Rev. d'Ent.* 24, p. 205, 1905.

as at present pending further investigation, as during the short time devoted to the group the following facts have been discovered:—

- (a) That the pupæ of *Eusphinctus* and *Phyracaces* are enclosed in cocoons similar to those of the typical *Ponerinae*.
- (b) A fully developed and winged female has been found in the genus *Eusphinctus*, s. str., which was characterised as having an ergatoid female.
- (c) The genus *Phyracaces*, in addition to having winged females, and developed females without wings, also includes ergatoid females, of which *Ph. keros*, Wheeler, appears to be a good example.

The female of *Ph. punctatissima*, sp. nov., is fully developed but has no traces of wing stumps.

The female of *Ph. gilesi*, sp. nov., is ergatoid, differing from the worker only by larger size, and in possessing ocelli.

The female *Ph. constricta*, sp. nov., is ergatoid, and was found, solitary, under a log, apparently founding a new colony.

The female taken with *Ph. simmonsae*, sp. nov., is ergatoid; this specimen was found with the brood, in the bottom chamber.

No females of *Ph. ruficornis*, sp. nov., were obtained in the nests, but two winged male pupæ were found in their cocoons. For the present the females of this group can only be regarded as of three forms—fully developed and winged; thorax developed but not winged; ergatoid.

From the above it will be seen that our knowledge of the females of the genus *Phyracaces* is not only incomplete, but is unsatisfactory, and careful investigation must be made before a satisfactory conclusion can be arrived at.

The females of *Eusphinctus* (*Nothosphinctus*) *fulvidus*, sp. nov., are ergatoid, closely resembling *E. (N.) manni*, Wheeler, and *E. (N.) imbecillis*, Forel.

The females of *Eusphinctus* (*Eusphinctus*) *steinheili*, Forel, and of *Eusphinctus* (*E.*) *hackeri*, Wheeler, are ergatoid; the female of *Eusphinctus* (*E.*) *occidentalis*, sp. nov., is winged.

Nests of *Eusphinctus*, *Nothosphinctus*, and some species of *Phyracaces* have been found associated with nests of the genus *Myrmecia*.

*Ph. simmonsae*, sp. nov., forage as a colony; *Ph. punctatissima* sp. nov. forage (or scout?) singly, running rapidly over and under stones, logs, leaves etc., with the abdomen turned up, in many cases almost touching the back of the thorax.

Types of the new species are in the author's collection.

*EUSPHINCTUS (EUSPHINCTUS) OCCIDENTALIS*, sp. nov. (Fig. 1).

Worker: Length 2.8—3.5mm.

Yellowish brown, mandibles and incisures of the antennal joints reddish: hairs yellow, moderately long, appressed, longest on the gaster: antennae and legs clothed with short yellow pubescence.

Head slightly longer than broad, slightly broader in front than behind, occipital border concave, corners sharp; frontal carinae approximated, surrounding the antennal insertions in front, truncated behind, extending to the top of the depression connecting the antennal fovea; clypeus short and rounded. Eyes and ocelli absent. Mandibles small, sharply bent near their base, distinctly dentate. Antennae short and stout, scapes about half the length of the head, gradually thickened to their apex; first funicular joint slightly longer than broad, second to ninth broader than long, apical joint pointed, longer than the four preceding

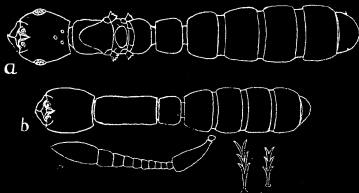


Fig. 1. *Eusphinctus (Eusphinctus) occidentalis* sp. nov.  
a. Dorsal view of female. b. Dorsal view of worker. c. Antenna of worker.  
d. Type of hairs on larva.

joints together. Thorax fully twice as long as broad, pronotum slightly broader than the epinotum, mesoepinotal suture feebly indicated, pronotum rounded and marginate in front, epinotal declivity marginate on the sides and top, corners sharp. Petiole broader than long, broader behind than in front, anterior border marginate, corners sharp, posterior corners well rounded; dorsal surface convex; ventral surface with a sharp hooked tooth in front. Postpetiole broader than long, distinctly broader behind than in front, sides and anterior border nearly straight, ventral surface in front protuberant and rounded. First gastric segment twice as broad as long. Pygidium truncate, flattened, submarginate and minutely spinulose on the sides and tip.

*Female*: Length 3.7—4.3mm. (dehated).

Differs from the worker in the following particulars:—Head, thorax, and petiole dark reddish brown, gaster yellowish brown, antennae and legs dark yellow; hairs long and yellow, more numerous on the gaster than elsewhere. Punctures finer and not so dense. Head as broad in front as behind. Eyes and ocelli moderately large and convex, the eyes placed well in front of the middle of the sides. Thorax two and a quarter times longer than broad, with distinct pronotal, mesonotal, scutellar, metanotal, parapteral, sternal and mesepimeral sclerites; wing stumps present and conspicuous. Gaster two and a half times longer than broad. Pygidium truncated, entire, convex, very minutely spinulose on the sides and tip.

Pupae, enclosed in cocoons.

*Hab.*: Western Australia, Mundaring (J. Clark).

Described from a colony consisting of 360 workers, 20 females, and a large number of eggs, larvae and pupae. The nest, which was under a small stone, was of very simple construction, consisting of a few small compartments connected by several passages and all were on the surface immediately under the stone. The eggs, larvae and pupae were in the compartment farthest from the entrance to the nest. A colony of *Myrmecia vindex* Sm. was under a large stone adjoining the one covering the nest of *E. occidentalis*.

*EUSPHINCTUS (NOTHOSPHINCTUS) FULVIDUS* sp. nov. (Fig. 2).

*Worker*: Length 3.4—5mm.

Brownish yellow, ranging to yellow in some specimens, mandibles, frontal carinae, and incisures of antennal joints darker; hairs on the head, thorax and gaster yellow; antennae and legs with short greyish pubescence. Head distinctly longer than broad, as broad in front as behind, finely and densely punctate, occipital border concave, with blunt posterior corners; frontal carinae short, surrounding the antennal insertions in front; carinae of the cheeks distinct; occipital border marginate; clypeus short and rounded. Eyes and ocelli absent. Mandibles curved at their base, external border slightly concave, strongly and evenly dentate. Antennae robust, scapes not half the length of the head, gradually thickened to their apex; funicular joints one to ten broader than long, the terminal joint slender, and longer than the four preceding joints together. Thorax twice as long as broad, finely and sparsely punctate, flattened above, sub-marginate on the sides, epinotal declivity steep and straight, with its sides and upper border marginate, mesonotal suture feebly indicated. Petiole broader than long, broader behind than in front; in profile as long as high,

ventral surface in front with a large blunt tooth. Postpetiole, one and one-half times broader than long, broader behind than in front, the anterior border straight, lateral borders slightly convex, corners bluntly rounded. Gastric segments broader than long, separated by pronounced constrictions. Pygidium truncated, blunt and entire at the tip, submarginate and minutely spinulose on the sides and tip.

*Female*: Length 7.6mm.

Differs from the worker in the following particulars:—Brownish yellow, mandibles and incisures of the antennal joints darker; hairs more abundant, erect and bristly, pubescence dense, especially on the gaster. Punctures finer and closer. Head about as long as broad. Eyes present but small, placed near the middle of the sides, the anterior ocellus is present but very minute. Thorax one and three-quarter times longer than broad, mesonotal suture feebly indicated. Petiole one and one-third times broader than long. Postpetiole and gaster larger, the incisures between the segments

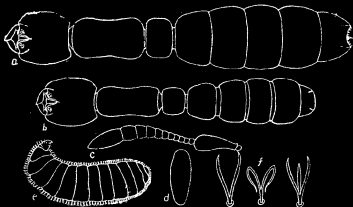


Fig. 2. *Eusphinctus (Nothosphinctus) fulvipes* sp. nov. a. Dorsal view of female. b. Dorsal view of worker. c. Antenna of worker. d. Egg. e. Larva. f. Types of hair on larva.

not pronounced. Pygidium broadly and deeply excised behind, its posterior surface truncated, with submarginate sides, the posterior excision with minute spinules.

*Egg*. Elongate-ovate, slightly coniform, two and three-quarter times as long as broad. White, with a tinge of yellow.

*Larva*.—Slender, enlarged at the posterior end, with thirteen distinct segments behind the head. Head as broad as long, with vestigial antennae. Mandibles long and indistinctly dentate. Hairs on the dorsal surface of the anterior eight segments bifurcate almost to their base, short and pointed; on the dorsal surface of the posterior three segments these hairs become long and whip-

like, gradually decreasing in length to the anterior margin of the ventral surface of the anal segment; the hairs on the ventral surface are trifurcate, and extend to the posterior and lateral surface of the head, where they are much shorter than on the body. Colour, yellowish white.

Several larvae, freshly emerged from the eggs, are clothed with long bristle-like hairs, not bifurcate at their tips; these hairs are few and scattered.

*Hab.*: Western Australia, Mundaring (J. Clark).

Described from a colony containing 680 workers, 1 female, and many eggs and larvæ; no pupæ were found. The nest was under a large stone, and had apparently been in use for a long time, as the excavations were considerable for the size of the ant, extending downward for ten inches, then in a horizontal direction for another six inches, where the queen, and the major portion of the eggs and larvæ were found. The same stone also covered a nest of *Myrmecia* (*Pristomyrmecia*) *mandibularis* Sm., the nests practically meeting at one of the side branches, or pockets, of the *mandibularis* nest.

This species is close to *Eusphinctus* (*Nothosphinctus*) *imbecillis*, For., and to *Eusphinctus* (*Nothosphinctus*) *manni*, Wheeler. The worker differs from the worker of *imbecillis*, in its more rectangular head, more robust and slightly larger size. The female of *imbecillis* is smaller than the female of *fulvidus*, and according to the description, it has no eyes or ocelli. The female of *manni* and *fulvidus* are very similar, but the workers differ considerably.

*EUSPHINCTUS* (*NOTHOSPHINCTUS*) *SILACEUS* sp. nov. (Fig. 31).

*Worker*: Length 4—5mm.

Reddish yellow; mandibles, carinae, and incisures of the antennal joints darker; hairs yellowish, short, abundant, sub-appressed; shorter and appressed on the antennae and legs. Head, thorax, petiole and gaster covered with piligerous punctures, which are more numerous on the head than elsewhere. Head longer than broad, as broad in front as behind, sides feebly rounded, posterior border concave, angles rounded; frontal carinae short, erect, truncated and fused behind; surrounding the antennal insertions in front; carinae of the cheeks indistinct; clypeus very short and rounded. Eyes and ocelli absent. Mandibles sub-triangular, deflected, strongly and evenly dentate. Antennae robust, scapes about half the length of the head, gradually thickened to their apex; funicular joints, one to nine broader than long, tenth as long as broad, terminal joint longer than the four preceding joints

together. Thorax fully twice as long as broad, as broad across the pronotum as across the epinotum, flattened above and on the sides; anterior and posterior borders rounded and marginate, epinotal declivity sloping, with marginate sides. Petiole broader than long, broader behind than in front, anterior border straight, angles sharp, lateral and posterior borders slightly convex, corners rounded; in profile flattened above, with straight anterior surface, the ventral surface in front with a long broad tooth-like process.

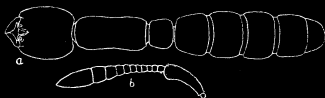


Fig. 3. *Eusphinctus (Nothosphinctus) silaceus* sp. nov. a. Dorsal view of worker. b. Antenna of worker.

Postpetiole about one and one-fourth times broader than long, broader behind than in front, anterior border nearly straight, angles feebly rounded, sides nearly straight; the ventral surface in front swollen and strongly protuberant. Pygidium flattened above, truncate, entire and blunt at the tip, with a row of spinules along each side, and on the tip. Legs short and stout.

Hab.:—Western Australia. Armadale (J. Clark).

Described from a large number of specimens found travelling in a column alongside a half buried log; the column extended from the log into very dense undergrowth; no nest of the species was found although the ants appeared to be coming from beneath the log. The log sheltered nests of *Camponotus prostans* Forel, and *Iridomyrmex discors* Forel.

#### PHYRACACES BREVICOLLIS sp. nov. (Fig. 4).

*Worker*: Length 6.1mm.

Red; antennal incisions and marginations darker; hairs yellow, slender and erect, long and dense on the gaster, shorter and more oblique on the appendages; antennæ with greyish pubescence. Upper surface of the body with sparse piligerous punctures, more numerous on the apical segments of the gaster than elsewhere. Head as long as broad, broader behind than in front, convex above, with truncate occipital region, posterior border concave, angles blunt; frontal carinæ rounded, truncated and confluent behind, extending back to about the middle of the eyes; carinæ of the cheeks



forming a sharp angle, extending back to, and almost encircling, the posterior margin of the eyes; clypeus short and rounded. Eyes large and convex, placed distinctly in front of the middle of the sides; ocelli absent. Mandibles large, triangular, deflected, finely dentate, the external borders concave, coarsely punctate. Antennæ long and robust, scapes more than half the length of the head, gradually thickened to their apex; funicular joints one to ten longer than broad, terminal joint longer than the two preceding joints together. Thorax very short and robust, one third longer than broad, as broad across the pronotum as across the epinotum, slightly constricted in the middle, mesonotal sutures feebly indicated; anterior and lateral borders of the pronotum convex, posterior and lateral borders of the epinotum convex, angles sharp, epinotal declivity straight; all four sides of the dorsum, and the declivity, strongly marginate. Petiole

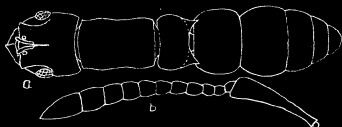


Fig. 4. *Phyracaces brevicollis* sp. nov. a. Dorsal view of worker. b. Antenna of worker.

distinctly broader than long, broader in front than behind, anterior border concave and feebly marginate, lateral borders convex and strongly marginate, posterior angles produced backward and upward as broad flat teeth; in profile convex above, anterior surface straight, ventral surface with a broad, blunt tooth in front. Postpetiole broader than long, a little broader behind than in front, anterior border straight, angles rounded, sides convex and marginate. First gastric segment fully one and one half times broader than long, broader behind than in front. Pygidium truncate, feebly concave above, marginate and minutely spinulose on the sides and tip. Legs long and stout.

*Hab*: Western Australia, Kelmescott (J. Clark).

One worker, found running amongst dead leaves.

*PHYRACACES CONSTRICTA* sp. nov. (Fig. 5).

*Female*: Length 7.4mm. Ergatoid.

Rich red throughout, marginations darker; hairs yellowish, sparse, fine and erect, longer on the gaster than on the rest of the

body; antennæ and legs with thin greyish pubescence. Upper surface of the body, antennæ, and legs with sparse, fine piligerous punctures. Head longer than broad, as broad in front as behind, occipital border concave, corners sharp; frontal carinæ large, erect, truncated and confluent behind; carinæ of the cheeks bluntly dentate in front, extending back to the anterior margin of the eyes; clypeus very short and broadly rounded. Eyes and ocelli large and convex. Mandibles large and deflected, triangular, finely dentate. Antennæ long and robust, scapes more than half the length of the head; first and second funicular joints longer than broad, third to tenth broader than long, terminal joint longer than the two preceding joints together. Thorax nearly one and one-third times longer than broad, pronotum distinctly broader than the epinotum, mesonotum strongly constricted, sutures feebly indicated, epinotal declivity concave; anterior and lateral borders of the pronotum strongly rounded and marginate, lateral borders of the mesonotum submarginate, lateral and posterior borders of

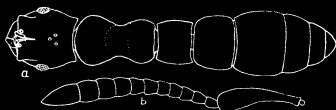


Fig. 5. *Phragmites constricta* sp. nov. female. a. Dorsal view. b. Antenna.

the epinotum and sides of the declivity strongly marginate. Petiole broader than long, broader behind than in front; anterior border concave and feebly marginate, corners sharp, lateral and posterior borders convex, strongly marginate, the corners produced backwards as sharp teeth; in profile slightly convex above, anterior surface strongly rounded, posterior surface straight; the ventral surface in front with a short blunt tooth. Postpetiole broader than long, broader behind than in front, anterior border straight, strongly marginate, angles rounded, sides convex and marginate. First gastric segment broader than long. Pygidium truncate, feebly marginate and minutely spinulose on the sides and tip. Legs long and slender.

*Hab.*: Western Australia, Armadale (J. Clark).

Described from a single specimen found in a cell under an old log on the hillside. The appearance of the cell suggested that this female was starting a new colony; it was pear-shaped, about one and one-quarter inches long, and one inch wide at the broad end, and barely one-quarter of an inch deep; the entrance had been

closed with the material excavated. The whole construction closely resembled the cells made by the females of the genus *Myrmecia*, differing only in size. No eggs were found in the cell.

*PHYRACACES GILESI* sp. nov. (Fig. 6).

*Worker*: Length 3.4—4mm.

Blackish; head, antennæ and legs reddish; posterior borders of apical segments of the gaster with a golden yellow tinge; hairs yellow, sparse, rather long and sub-erect; antennæ and legs with fine greyish pubescence. Upper surface of the body with sparse piligerous punctures. Head longer than broad, as broad in front as behind, occipital border concave, angles sharp; frontal carinæ erect, truncate and confluent behind, extending back to about the middle of the eyes; carinæ of the cheeks with a prominent angle, extending back to near the middle of the eyes; clypeus short and rounded. Eyes moderately large and convex, placed well in front of the middle of the sides, ocelli absent. Mandibles triangular, external border slightly concave, finely and evenly dentate. Antennæ

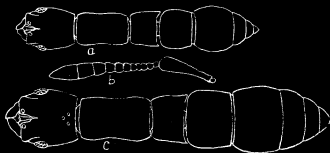


Fig. 6. *Phyracaces Gilesi* sp. nov. a. Dorsal view of worker. b. ANTENNA of same. c. Dorsal view of female.

robust, the scapes just reach the hind margin of the eyes, enlarged to their apex; first joint of the funiculus as long as broad, second to ninth broader than long, tenth longer than broad, terminal joint pointed, equals the two preceding joints together. Thorax one and one-half times longer than broad, as broad across the pronotum as across the epinotum, slightly constricted in the middle, anterior, lateral and posterior borders, and sides of the declivity marginate; in profile evenly rounded and convex above. Petiole slightly broader than the epinotum, broader than long, and broader behind than in front; anterior border slightly concave, angles sharp, lateral borders convex, posterior border nearly straight, the angles

produced backward and upward as small teeth, all the borders marginate; in profile slightly convex above, the ventral surface in front with a small sharp tooth-like projection. Postpetiole broader than the petiole, slightly broader in front than behind, anterior and lateral borders rounded and marginate. A slight constriction between the postpetiole and the first segment of the gaster, which is broader than the postpetiole, and one and one-fourth times broader than long. Pygidium truncate, feebly marginate and minutely spinulose on the sides and tip.

*Female*: Length 4.7—5mm. Ergatoid.

Resembles the worker, but with larger eyes, and with large convex ocelli. Thorax slightly more concave on the sides, mesonotal sutures feebly indicated. Gaster much larger. The colour differs slightly; the head, mesonotum, margin of the petiole, anterior and posterior margins of the postpetiole, antennæ and legs reddish yellow; the two apical segments of the gaster golden yellow.

*Egg*: Elongate-oval, whitish, semi-transparent, two and three-quarter times longer than broad.

*Larva*: Long and slender, almost cylindrical, slightly thickened at the anterior end, with thirteen distinct segments behind the head. Head small, slightly broader than long, with vestigial antennæ, and short blunt mandibles. Colour dull white; hairs short and bifurcated, except on the head, where they are sparse and not bifurcated.

*Pupa*: Enclosed in a semi-opaque, parchment-like cocoon.

*Hab.*: Western Australia, Mundaring (J. Clark).

Described from numerous workers, three females, and many eggs, larvæ and pupæ, taken in a nest under a stone.

This species has been dedicated to Mr. H. M. Giles, the veteran Entomologist of Western Australia.

#### PHYRACACES NEWMANI sp. nov. (Fig. 7.)

*Worker*: Length 4.2—5mm.

Red; terminal joints of the antennæ, and legs darker; hairs yellowish, sparse, long slender and erect, more numerous on the gaster than elsewhere, shorter and more oblique on the appendages; terminal joints of the antennæ with greyish pubescence.

Head longer than broad, broader behind than in front, occipital border concave, marginate, corners bluntly rounded; frontal carinæ erect, truncated and confluent behind, extending back to near the middle of the eyes; carinæ of the cheeks with a prominent angle in front, extending back beyond the middle of the eyes, a small

branch extended inward to each antennal fovea; clypeus short and broadly rounded. Eyes large and convex, placed slightly in front of the middle of the sides, ocelli absent. Mandibles large, triangular, deflected, the external borders concave, dentate, coarsely and sparsely punctate. Antennae robust, scapes reach the posterior margin of the eyes, gradually thickened to their tips; funicular joints, one to three, as long as broad, fourth to eighth slightly broader than long, ninth and tenth longer than broad, terminal joint as long as the two preceding joints together. Thorax one and two third times longer than broad, broader across the pronotum than across the epinotum, narrowed in the mesonotal region; anterior border of the pronotum straight, angles broadly rounded, posterior border of the epinotum slightly concave, angles blunt; in profile the dorsal surface rounded and slightly convex, epinotal declivity slightly convex; all four sides of the dorsum, and sides of the declivity, strongly marginate. Petiole broader than long, broader behind than in front, anterior border

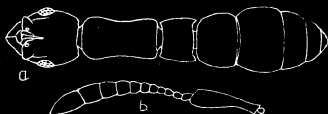


Fig. 7. *Phyracnestes Newmani* sp. nov. a. Dorsal view of worker. b. Antenna of same.

widely concave, angles sharp, lateral and posterior borders convex, angles produced backward as blunt teeth; in profile cubic, nearly flat above, anterior and posterior surfaces straight, the ventral surface with a short blunt tooth in front. Postpetiole broader than the petiole, broader behind than in front, anterior border straight, angles rounded, sides evenly convex and marginate. A slight constriction between the postpetiole and first gastric segment, which is broader than long, and broader behind than in front. Pygidium truncate, feebly marginate and minutely spinulose on the sides and tip. Legs moderately stout, coxae of the hind pair with a large translucent lamella at the tip on the inner side.

*Hab.*: Western Australia, Mundaring (J. Clark).

Described from many workers, forming the major portion of a colony, which was found adjoining a nest of *Myrmecia ludlowi*, Crawley, which was being dug up for observation. The entrance to the nest of *Ph. newmani* was about fifteen inches from the entrance to the *ludlowi* nest, but on digging down eighteen inches into

the queen chamber of the *ludlowi* nest it was found that both nests practically met at this point, suggesting that the colony of *newmani* was parasitic on the brood of *ludlowi*, more so as the tunnels of *newmani* connected with the cells of *ludlowi* at various places. The small size of the *Phyracaces* tunnels made it impossible for the large *Myrmecia* to follow in defence. This species has been dedicated to Mr. L. J. Newman, Economic Entomologist of Western Australia.

PHYRACACES PUNCTATISSIMA sp. nov. (Fig 8).

*Worker*: Length 6—7.2mm.

Bright castaneous throughout, with only the mandibles, the edge of the frontal carinae, the marginations of the head and body darker; hairs yellowish, sparse, long, slender and erect, more numerous on the gaster than elsewhere, shorter and more oblique on the appendages; antennae, dorsal surface of the petiole and postpetiole with conspicuous greyish pubescence. Head longer than broad, as broad in front as behind, convex above with truncated occipital region, occipital broader, slightly concave, marginate, angles sharp; frontal carinae large, erect, truncated and confluent behind, extending back to the middle of the eyes; carinae of the cheeks with a prominent angle in front, extending back to the posterior margin of the eyes, a short branch directed inward to each antennal fovea; clypeus short, broadly rounded. Eyes moderately large and convex, placed slightly in front of the middle of the sides, ocelli absent. Mandibles triangular, deflected, external borders nearly straight, coarsely and sparsely punctate. Antennae robust, scapes reach to the middle of the eyes, gradually thickened to their tips; funicular joints, two to eight, broader than long, ninth and tenth longer than broad, terminal joint tapering and pointed, longer than the two preceding joints together. Thorax narrower than the head, one and two-thirds times longer than broad, broader across the pronotum than across the epinotum, narrowed in the middle, mesonotal sutures feebly indicated; in profile feebly convex and rounded, epinotal declivity abrupt, concave; anterior border of the pronotum convex, angles sharp, posterior border of the epinotum straight, slightly excised in the middle, angles sharp; borders of the pronotum and of the epinotum and sides of the declivity strongly marginate, lateral borders of the mesonotum feebly marginate. Petiole broader than long, broader behind than in front, its anterior border concave, with sharp pointed corners, lateral and posterior borders straight with the corners produced backward as broad sharp teeth, the lateral borders marginate; the dorsal surface densely covered with very small punctures; in profile feebly convex

above, the anterior surface convex, the ventral surface with a strong tooth in front. Postpetiole a little broader than the petiole, very slightly broader than long, slightly broader behind than in front, anterior and lateral borders slightly convex, the corners rounded; the dorsal surface densely covered with very small punctures. A slight constriction between the postpetiole and the first segment of the gaster. Pygidium marginate and minutely spinulose on the sides and tip. Legs moderately long and stout.

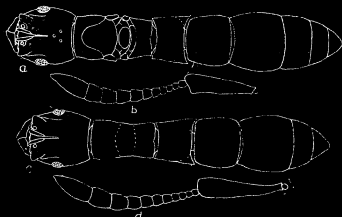


Fig. 8. *Phyracness punctatissima* sp. nov. a. Dorsal view of female. b. Antenna of female. c. Dorsal view of worker. d. Antenna of worker.

*Female*: Length 8—8.3mm.

Resembles the worker but has larger eyes, ocelli, and a different thorax. The latter, not so broad as the head, is one and three-quarter times longer than broad, with distinct pronotal, mesonotal, scutellar, metanotal, parapteral, sternal and mesepimeral sclerites, though there are no traces of wing stumps. The mesonotum is twice as broad as long. Gaster twice as long as broad. Sculpture, pilosity and colour similar to those of the worker.

*Hab*: Western Australia, Mundaring (J. Clark).

This species comes near *Ph. clarki*, Crawley, but can be readily distinguished by its more slender build, and very different petiole and postpetiole.

The colony obtained consisted of 160 workers, four females, and a large number of larvæ and pupæ. The nest was underground and extended down nineteen inches, where the females and brood were obtained. This ant has a peculiar habit of turning its abdomen up over its back when running, and looks very much like a red Staphylinid beetle; it hunts singly, and in all directions near the nest.

## PHYRACACES RUFICORNIS sp. nov. (Fig. 9).

Worker: Length 6—6.8mm.

Black; antennæ and tarsi reddish, mandibles, femora, tibia, pygidium and sting brownish; hairs yellowish, suberect, long and pointed, more numerous on the gaster than on the rest of the body, shorter and finer on the antennæ and legs. Head longer than broad, as broad in front as behind, slightly constricted in the occipital region, convex above, occipital border widely concave, strongly marginate, corners acutely produced; frontal carinæ erect, truncated and confluent behind; carinæ of the cheeks with a prominent tooth or angle, extending backward to near the middle of the eyes, a small branch directed inward to each antennal fovea; clypeus short and rounded. Eyes moderately large, placed in front of the middle of the sides, ocelli absent. Mandibles triangular, deflected, external borders nearly straight, dentate, coarsely and sparsely punctate. Antennæ long and robust, scapes fully half the length of the head, gradually thickened to their



Fig. 9. *Phyracaces ruficornis* sp. nov. a. Dorsal view of worker. b. Antenna of worker.

apex; funicular joints, second to ninth, broader than long, tenth as long as broad, terminal joint tapering, pointed, as long as the two preceding joints together. Thorax a little more than one and a half times as long as broad, epinotum very slightly broader than the pronotum, slightly constricted in the mesonotal region, mesonotal sutures feebly indicated; anterior border of the pronotum convex, corners sharp, posterior border of the epinotum nearly straight, slightly excised in the middle; all four sides of the dorsum, and sides of the declivity, strongly marginate; in profile, evenly convex above, with straight, nearly vertical declivity; the ventral surface in front with a sharp tooth. Petiole broader than long, slightly broader behind than in front, anterior border widely concave, lateral and posterior borders convex, the angles produced backward as small flattened, acute teeth, all four sides marginate; in profile the surface and the anterior declivity are convex, sides nearly straight,



the ventral surface in front with a sharp tooth projecting slightly backward. Postpetiole about one and one-third times as broad as long, slightly broader behind than in front, anterior and lateral borders convex and marginate. First gastric segment broader than the postpetiole, broader than long. Pygidium truncate and bluntly pointed at the tip, concave above, marginate and minutely spinulose on the sides and tip; posterior borders of the gastric segments, and sides of the pygidium, densely and finely punctate.

*Larva*: Long and slender, with vestigial antennæ.

*Pupa*: Enclosed in reddish-yellow, parchment-like cocoon. The pupæ of several males were found in their cocoons, but they were not fully matured. These males varied in size from 5.5 to 6mm. The antennæ are thirteen jointed. Head and body black, antennæ red.

*Hab*: Western Australia: Armadale, Mundaring (J. Clark).

Described from several workers forming the major portion of a colony found under a piece of rotten timber near Mundaring; no female was found in the nest.

Three specimens found running amongst large stones at Armadale belong to this species; they are slightly larger than the typical form, but are otherwise identical.

#### PHYRACACES SIMMONSÆ sp. nov. (Fig. 10).

*Worker*: Length 4—4.2mm.

Red; base of scapes, incisures of the funicular joints, base of the femora and tibia reddish-brown, marginations black; hairs yellowish, erect, rather long and pointed, sparse, not longer and denser on the gaster than on the rest of the body; antennæ and legs with rather long, appressed, greyish pubescence. Head longer than broad, as broad in front as behind, occipital border widely concave, marginate, angles sharp; frontal carinæ erect, extending back to the eyes; carinæ of the cheeks forming a prominent blunt tooth in front, and extending back beyond the middle of the eyes; clypeus short and rounded. Eyes large, slightly flattened, placed slightly in front of the middle of the sides, ocelli absent. Mandibles large, external borders nearly straight, dentate, coarsely and sparsely punctate. Antennæ robust, scapes reach the posterior margin of the eyes, gradually thickened to their tips; funicular joints one to nine a little broader than long, tenth as broad as long, terminal joint tapering and pointed, longer than the two preceding joints together; base of the antennal depression reticulate-punctate, with a few rugæ on the side of the depression,

the rest of the head with small, scattered, piligerous punctures. Thorax a little more than one and a half times longer than broad, as broad across the pronotum as across the epinotum, slightly narrowed in the middle, anterior and lateral borders of the pronotum strongly marginate, lateral borders of the mesonotum, lateral and posterior border of the epinotum submarginate, epinotal declivity sharply marginate; in profile the dorsal surface feebly convex. Petiole one and a half times broader than long, anterior border concave, the lateral borders gently rounded to the posterior third, then abruptly rounded to the posterior border, which is very short; all four sides of the dorsum strongly marginate; in profile cubic, dorsal

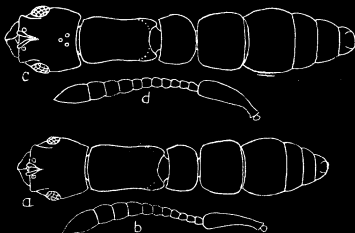


Fig. 10. *Phyracces Simmonense* sp. nov. a. Dorsal view of worker. b. Antenna of same. c. Dorsal view of female. d. Antenna of same.

surface slightly convex, anterior surface straight and at right angles to the dorsal surface, posterior surface convex; the ventral surface with a projection, more than half the length of the surface, from which arises a short blunt tooth, directed backward. Postpetiole broader than long, broader behind than in front, sides slightly convex, anterior and lateral borders strongly marginate. First gastric segment broader than long, broader behind than in front, sides strongly convex. Pygidium with a large concave depression on its dorsal surface, marginate and minutely spinulose on the sides and tip.

*Female:* Length 4.8mm.

Differs from the worker in its much larger size, larger and more convex eyes, and presence of ocelli. Head more rectangular, and

slightly broader behind than in front, broader than the pronotum. Pronotum slightly broader than the epinotum. Petiole broader than the thorax, and one and one-third times broader than long. Postpetiole and gaster separated by a small constriction, the latter one and three-quarter times longer than broad. Sculpture and pilosity similar. Head, thorax, petiole and postpetiole rich red, gaster yellowish-red.

*Larva*: Long and slender, subcylindrical, slightly thickened to the posterior end, with thirteen distinct segments behind the head, which is short and broad. Hairs short and stout, bifurcated to one-third of their length. Colour dull white.

*Pupa*: Enclosed in reddish-yellow, parchment-like cocoon. The pupæ of two males were found in their cocoons, but were not fully developed. The males measure 4.7–5.3mm.; the antennæ, which are thirteen jointed, reach to the first gastric segment. Eyes and ocelli large.

*Hab*: Western Australia: Denmark (Miss E. Simmons), Mundaring (J. Clark).

Described from a small colony taken near Mundaring, and a single worker obtained by Miss Simmons at Denmark in October, 1922. The specimen from Denmark no doubt formed part of a raiding party, as the colony taken at Mundaring was noticed whilst its members were raiding a nest of *Cremastogaster rufotestaceus*, Mayr, and were traced to their nest, about thirty yards away. The *Phyracaces* were taking both larvæ and pupæ from the *Cremastogaster* nest, and apparently, got very little opposition from the ants of the latter nest, who seemed to concentrate their energy to removing their brood. The *Phyracaces* did not move in a body, but worked much as do the species of *Iridomyrmex*, a constant stream of ants coming and going between the two nests with usually a gap of many inches between the workers. The nest of *Ph. simmonsae* was very inconspicuous, being indicated merely by a small hole, less than one quarter of an inch in diameter, on level ground. This nest extended underground for eleven inches, ending in an elongate chamber, where the female and her brood were found. A number of *Cremastogaster* larvæ and pupæ were also found in the chamber. This species has been dedicated to Miss E. Simmons, an enthusiastic naturalist in the Denmark district.